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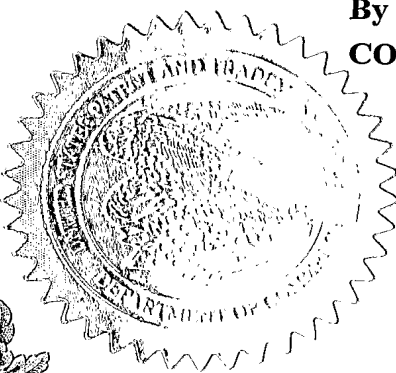
June 15, 2005

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 10/783,137

FILING DATE: February 19, 2004

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS



N. Woodson
N. WOODSON
Certifying Officer

UTILITY PATENT APPLICATION TRANSMITTAL

(Use for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.

First Inventor

Title

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Attach an original and a duplicate for fee processing)
2. ☒ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages]
(prepared according to the rules)
- Descriptive title of the invention
- Cross Reference to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to sequence listing, a table,
or a computer program listing appendix
- Background of the invention
- Brief Summary of the invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets]

5. Oath or Declaration [Total Pages]

- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 CFR 1.53 (d))
(for continuation/divisional with Box 18 completed)

☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
under the prior application, see 37 CFR
1.53(d)(2) and 1.53(d).

6. ☐ Application Data Sheet. See 37 CFR 1.76

ADDRESS TO:

Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

7. ☐ CD-ROM or CD-R in duplicate, large table or
Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
 - a. ☐ Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i. ☐ CD-ROM or CD-R (2 copies); or
 - ii. ☐ paper
 - c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement [Power of Attorney]
(when there is an assignee)
11. ☐ English-Translation Document (if applicable)
12. ☐ Information Disclosure Statement (IDS)/PTO-1449 [Copies of IDS
Challenges]
13. ☐ Preliminary Amendment
14. ☐ Return Receipt Postcard (MPEP 503)
(Should be specifically identified)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122
(b)(2)(B)(i). Applicant must attach form PTO/SB/305
or its equivalent.
17. ☐ Other: **NONPUBLISHED ELEMENTS**

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No. _____

Priority Information:

Examiner _____

Group Art Unit _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been specifically certified from the submitted application parts.

19. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label [Insert Customer No. or Attach bar code label here] or ☐ Correspondence address below

Name **THOMAS AGAPIADES**
Address **744 BRIDGE STREET**
City **YUBA CITY** State **CA** Zip Code **95991**
Country **USA** Telephone **530-218-4020** Fax _____

Name (Print/Type) **THOMAS AGAPIADES** Registration No. (Attorney/Agent) _____
Signature **[Signature]** Date **02-19-04**

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021504

FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$)

Complete if Known

Application Number	
Filing Date	
First Named Inventor	THOMAS AGAPIDAKIS
Examiner Name	
Group Art Unit	
Attorney Docket No.	

METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☐ Deposit Account:

Deposit Account Number	
Deposit Account Name	

The Commissioner is authorized to (check all that apply)

☐ Charge fee(s) indicated below. ☐ Credit any overpayments.
☐ Charge any additional fee(s) during the pendency of this application.
☐ Charge fee(s) indicated below, except for the filing fee in the above-indicated deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code (S)	Fee Code (S)	Fee Code (S)	Fee Code (S)		
101 700	201 300			Utility filing fee	385
100 300	200 100			Design filing fee	
107 010	207 200			Plant filing fee	
108 700	208 370			Reissue filing fee	
104 100	214 80			Provisional filing fee	

SUBTOTAL (1) (\$)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims		Extra Claims		Fee from		Fee Paid	
Independent		-30% =					
Multiple Dependent		-5% =					

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code (S)	Fee Code (S)	Fee Code (S)	Fee Code (S)		
100 10	200 0			Claims in excess of 20	
100 01	200 02			Independent claims in excess of 3	
101 200	204 100			Multiple dependent claims, if not paid	
100 04	200 02			** Refuse independent claims over original patent	
110 10	210 0			** Refuse claims in excess of 20 and over original patent	

SUBTOTAL (2) (\$)

*or number previously paid, if greater. For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Table

Fee Code (S)	Fee Code (S)	Fee Description	Fee Paid
100 100	200 00	Surcharge - late filing fee or oath	
127 00	227 20	Surcharge - late provisional filing fee or cover sheet	
130 100	230 100	Non-English specification	
147 2,000	147 2,000	For filing a request for an oral examination	
112 000	112 000	Requesting publication of BIF prior to Examiner action	
113 1,000	113 1,000	Requesting publication of BIF after Examiner action	
110 110	210 00	Extension for reply within first month	
110 400	210 200	Extension for reply within second month	
117 000	217 400	Extension for reply within third month	
110 1,400	210 700	Extension for reply within fourth month	
120 1,000	220 000	Extension for reply within fifth month	
110 300	210 100	Notice of Appeal	
120 300	220 100	Filing a brief in support of an appeal	
121 200	221 100	Request for oral hearing	
120 1,010	120 1,010	Petition to institute a public use proceeding	
140 110	240 00	Petition to revive - unintentional	
141 1,200	241 000	Petition to revive - unintentional	
142 1,200	242 000	Utility issue fee (for reissue)	
143 400	243 200	Design issue fee	
144 030	244 210	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
120 00	120 00	Processing fee under 37 CFR 1.17(c)	
120 100	120 100	Submission of Information Disclosure Sheet	
001 40	001 40	Recording each patent assignment per property (less number of properties)	
140 700	240 370	Filing a submission after final rejection (37 CFR § 1.129(a))	
140 740	240 370	For each additional invention to be examined (37 CFR § 1.129(a))	
170 740	270 370	Request for Continued Examination (RCE)	
100 000	100 000	Request for expedited examination of a design application	

Other fee (specify):

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)

SUBMITTED BY		Complete if known	
Name (Print/PA)	THOMAS AGAPIDAKIS	Registration No.	
Signature	<i>Thomas Agapidakis</i>	Telephone	530-218-4020
		Date	02-19-04

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DISC VALVE INTERMEDIATE RING SEAL

BACKGROUND OF THE INVENTION

The invention is an intermediate ring seal placed in sliding contact at its upper ring surfaces with a rotatively mounted disc valve in an engine cylinder head. A sealing ring groove machined on the outer perimeter surface of the said ring holds a seal which is fixedly held by a pin in stationary contact with the inner surfaces of the engine cylinder.

In previous designs and proprietary illustrations, the stationary sealing contact has been in the cylinder head. In the present invention a ringed skirt has been placed within the inner diameter of the disc valve gear and extended downward over the outer surfaces of the engine cylinder. The stationary seal of the intermediate ring in the present invention is now at the engine cylinder inside surfaces.

The novelty of the present invention is in the method of sealing the combustion chamber of a rotary disc valve engine between the cylinder head and the engine cylinder. At the cylinder the intermediate ring seal provides a static seal with the engine cylinder by a seal operating within a seal groove machined into the outer surface of the intermediate ring seal. By this description, it can be seen that the intermediate ring seal comprises both dynamic and static sealing characteristics as a sealing interface between the rotating surfaces of the disc valve and stationary sealing surfaces of the engine cylinder.

Dynamic and static sealing between the rotating disc valve and stationary engine cylinder must occur within the limited axial length of

1 the combustion volume. To alleviate this restrictive spatial requirement
2 a skirt extension has been added to the disc valve which extends the
3 axial length of the sealing contact between the dynamic seal and
4 stationary seal without changing the combustion volume which would
5 change the engine compression ratio and alter its performance.

6 The novelty of the invention is the extension of the axial distance
7 between the dynamic seal and stationary sealing surfaces such that they
8 overlap the interface between the cylinder head and engine cylinder,
9 facilitating engine component manufacture and installation of the
10 cylinder head on the engine cylinder with improved sealing reliability.

11 SUMMARY OF THE INVENTION

12 The invention is a new and improved method of sealing the
13 combustion volume of a disc valve engine. The seal must provide
14 dynamic sealing against the sliding surfaces of the disc valve and also
15 provide static seal with the engine cylinder. These seals must be
16 effective in the limiting axial length of the combustion volume
17 measured as the distance between the engine piston crown and the
18 cylinder head surface configured within the confining surface of the
19 disc valve. To facilitate the sealing function the intermediate ring seal
20 is designed to overlap the interface between the engine cylinder head
21 and engine cylinder.

22 It is a primary objective of the invention to place a skirt
23 extension on the disc valve that will overlap the interface between the
24 engine cylinder head and the engine cylinder.

25 It is another objective of the invention to place the intermediate
26

1 ring seal between the engine cylinder and the disc valve extension.

2 It is yet another object of the invention to place a static seal
3 between the said engine cylinder and said intermediate ring seal.
4

5 BRIEF DESCRIPTION OF THE DRAWINGS

6 Drawings are presented showing the method of extending the
7 lower portion of the disc valve to form a cylindered skirt. The
8 drawings also show the method of installing an intermediate ring seal
9 to provide a dynamic seal with the sliding surface of the disc valve and
10 the static seal with the engine cylinder.
11

12 Figure 1 Is the bottom view of the disc valve.
13

14 Figure 2 Is a side view of the disc valve of Fig. 1 sectioned
15 diagonally.
16

17 Figure 3 Is a side view of the intermediate ring seal.
18

19 Figure 4 Is a top view of the intermediate ring seal.
20

21 Figure 5 Is a view of the assembly of the interfacing elements of the
22 disc valve skirt with the static seal of the intermediate ring
23 seal with the engine cylinder and the dynamic sliding seal
24 with the disc valve sliding surfaces, shown in partial cross-
25 section.
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DETAILED DESCRIPTION OF THE INVENTION

In the detailed description of the invention, and its manner of operation, only three major components are required to define the novel features of the design.

- Rotating disc valve
- Intermediate ring seal
- Stationary engine cylinder

The novel feature of the invention is the facilitation of the intermediate ring seal to effectively seal the combustion chamber of an engine by forming a dynamic sliding seal with the rotating disc valve and a static seal with the stationary engine cylinder within the limiting axial distance of the combustion volume when the engine piston is at top-dead-center at the end of its compression stroke. The novelty of the effective static sealing is achieved by extending the under side of the disc valve to form a cylindrical skirt that extends over the engine cylinder allowing for an intervening space for the intermediate ring to seal against the said engine cylinder.

Turning now to FIG. 1 of the drawings. FIG. 1 is the bottom view of the disc valve 1 showing the intake port 2 and exhaust port 3, gear teeth 4, skirt 5, and sealing surface 6. The novel feature of the disc valve of FIG. 1 is skirt 5.

FIG. 2 is a side view of the disc valve 1 shown in cross-section taken across FIG. 1. In this view the disc valve axle 7 and spark plug threaded hole 8 are shown. Disc valve 1 is rotatively mounted in the

1 engine cylinder head bearings which hold disc valve axle 7. Rotation
2 of disc valve 1 opens and closes intake port 2 and exhaust port 3 in a
3 synergistic manner with corresponding two ports in the cylinder head.
4 Those skilled-in-the-art will readily recognize that disc valve 1 may
5 have a plurality of intake ports 2 and exhaust ports 3 at slow rates of
6 rotation relative to engine crankshaft revolution without effecting the
7 novelty of design. In this description only one intake port 2 and one
8 exhaust port 3 are shown for clarity and simplification of the
9 description.

10 Turning now to FIG. 3. FIG. 3 is a side view of the intermediate
11 ring seal 9. A groove 10 (not shown in this view) is machined on the
12 outer perimeter of the said intermediate ring seal 9 to hold a stationary
13 seal 11. At the bottom edge of intermediate ring seal 9 is a recess 12
14 for accepting a staking pin 16 (not shown in this view) for holding the
15 intermediate ring seal in place and preventing its rotation.

16 FIG. 4 is a top view of the intermediate ring seal 9.

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18 Turning now to FIG. 5. FIG. 5 shows the assembly of the disc
19 valve 1, intermediate ring seal 9, and the engine cylinder 13 in partial
20 cross-section. The sliding seal surface between the intermediate ring
21 seal 9 and the disc valve 1 is shown as dynamic interface 14. The
22 stationary seal 11 in contact with engine cylinder 13 is shown as static
23 interface 15.

1
2 CLAIMS

3 What is claimed is:

4 1. An intermediate ring seal in rotative contact with a disc valve
5 forming a dynamic seal at the interface of said rotative contact, said
6 intermediate ring seal having a groove machined on the outer perimeter
7 surface, said groove holding a stationary seal, said stationary seal in
8 sealing contact with an engine cylinder, said intermediate ring seal
9 having a recess at its bottom edge, a pin fixedly mounted in said engine
10 cylinder and fitting into said recess to prevent rotation of said
11 intermediate ring seal.
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1 ABSTRACT

2 Between the cylinder head and combustion chamber of an
3 internal combustion engine, an intermediate sealing ring. The sealing
4 ring is in sliding contact at its top circular surface with a disc valve
5 rotatively mounted in said cylinder head and at its outer periphery in
6 fixed sealing contact with the inner surface of the engine cylinder of
7 said engine combustion chamber. The purpose of the intermediate seal
8 is to confine the working fluids, being acted upon by the reciprocating
9 motion of the engine piston, across the stationary interface of the
10 engine cylinder and rotative surface of the disc valve.
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Numbered Elements of the Drawings

- 1
- 2
- 3 1. disc valve
- 4 2. intake port
- 5 3. exhaust port
- 6 4. gear teeth
- 7 5. skirt
- 8 6. sliding seal surface
- 9 7. disc valve axle
- 10 8. threaded hole
- 11 9. intermediate ring seal
- 12 10 seal groove
- 13 11. stationary seal
- 14 12. groove
- 15 13. engine cylinder
- 16 14. dynamic interface
- 17 15. static interface
- 18 16. pin
- 19
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**DECLARATION FOR UTILITY OR
DESIGN
PATENT APPLICATION
(37 CFR 1.63)**

☒ Declaration Submitted with Initial Filing OR ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number

First Named Inventor

COMPLETE IF KNOWN

Application Number

Filing Date

Art Unit

Examiner Name

As the below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

DISC VALVE INTERMEDIATE RING SEAL

(Title of the Invention)

the specification of which

☒ is attached hereto

OR

☐ was used on (MMDD/YYYY)

as a United States Application Number or PCT International

Application Number and was amended on (MMDD/YYYY) (# applicable).

I hereby state that I have reviewed and understood the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.53, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(b) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MMDD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

(Page 1 of 2)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventorGiven Name **THOMAS AGAPIADES**
(first and middle [if any])Family Name
or SurnameInventor's
SignatureDate **02-19-04**Residence: City **YUBA CITY** State **CA** Country **USA** CitizenshipMailing Address **744 BRIDGE STREET**City **YUBA CITY** State **CA** ZIP **95991** Country **USA**NAME OF SECOND INVENTOR: ☐ A petition has been filed for this unsigned inventorGiven Name
(first and middle [if any])Family Name
or SurnameInventor's
Signature

Date

Residence: City State Country Citizenship

Mailing Address

City State ZIP Country

☐ Additional inventors are being named on the supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.

[Page 2 of 2]

Applicant or Patentee: _____ Attorney's
 Serial or Patent No.: _____ Docket No.: _____
 Filed or Issued: _____
 For: _____

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
 STATUS (37 CFR 1.9 (f) and 1.27 (b)) — INDEPENDENT INVENTOR**

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9 (c) for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled _____ described in

☒ the specification filed herewith
☐ application serial no. _____, filed _____
☐ patent no. _____, issued _____

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9 (c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9 (d) or a nonprofit organization under 37 CFR 1.9 (e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ no such person, concern, or organization
☐ persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME THOMAS AGAPIADES
 ADDRESS 744 BRIDGE STREET YUBA CITY CA. 95911
☒ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

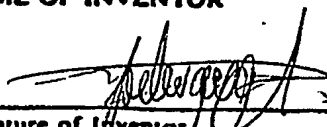
FULL NAME _____
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FULL NAME _____
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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28 (b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

THOMAS AGAPIADES

NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
		
Signature of Inventor	Signature of Inventor	Signature of Inventor
<u>02-19-04</u>		
Date	Date	Date

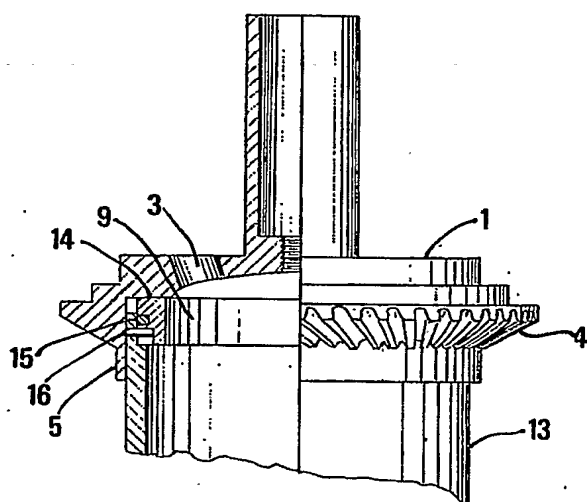


Fig. 5

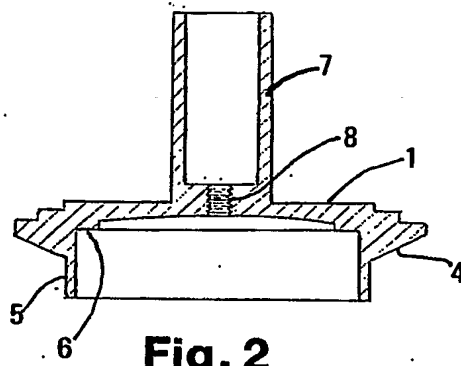


Fig. 2

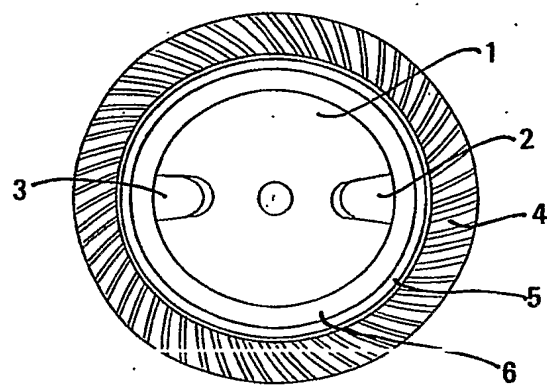


Fig. 1

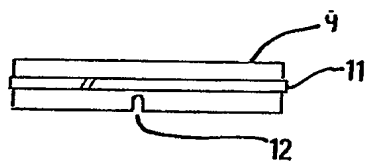


Fig. 3

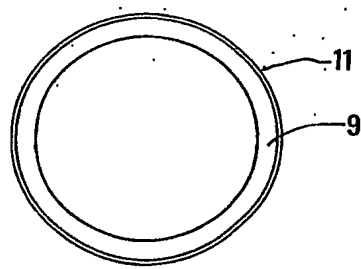


Fig. 4

